

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/GB2004/005437	International filing date (day/month/year) 20/12/2004	(Earliest) Priority Date (day/month/year) 20/12/2003
Applicant PAPE, Leslie		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).



- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

RESISTANCE EXERCISE CLOTHING

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.



- b. none of the figures is to be published with the abstract.

IMPROVEMENTS IN OR RELATING TO CLOTHING

This invention relates to a clothing article which, when worn, can provide resistance to bending of at least one joint of the wearer.

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The natural movement of the body creates a natural exercise for the muscles terminating at the joint regions. The amount of exercise depends upon the amount of resistance which there is to that movement.

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US-A-4065814; US-A-4910802; US-A-5109546 and US-A-5186701 all disclose, as their sole embodiment, or one of their embodiments, a clothing article comprised of clothing material including portions to be worn over a human being's joints and, incorporated in those portions, elongate resilient pieces which extend through the portions. In all of them, the main resistance to exercise of the muscles terminating at the joints is tension in the elongate resilient pieces. In US-A-4065814; US-A-4910802 and US-A-5109546, the pieces take the form of elastic bands. In US-A-5186701, the pieces take the form of elastic cords.

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According to one aspect of the present invention, there is provided a clothing article comprised of clothing material including a portion to be worn over a wearer's joint and, incorporated onto or into said portion, an elongate resilient piece which extends through said portion and which, when not under external stress, has a particular shape and, when the article is not being worn, maintains substantially that shape against the weight of the clothing material.

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According to a second aspect of the present invention, there is provided a clothing article comprised of clothing material including a portion to be worn over a wearer's joint and, incorporating onto or into said portion, an elongate

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resilient piece which extends through said portion and which, when the article is being worn and said joint bends, bends to provide most of exercise resistance rather than stretches longitudinally to provide most of exercise resistance.

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According to a third aspect of the present invention, there is provided a method comprising bending a body joint against bending resistance of an elongate resilient piece which extends through a portion of clothing material worn over said joint, the bending resistance providing most of the exercise resistance.

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Owing to the invention, it is possible to avoid any need to anchor the elongate resilient piece at its ends, whereby the clothing article can be simplified and made more comfortable to wear.

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The elongate resilient piece constitutes a built-in resistance device which significantly resists bending and which, when released, has memory which rapidly returns the device to its original shape.

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The elongate resilient piece may be made of a substance such as elastomeric material, for example rubber or plastics, or such as metal. The elongate resilient piece may be helical, such as in the form of an extension spring, or strip-like in form.

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For one or more body joints, a single elongate resilient piece can be used, or alternatively a plurality of elongate resilient pieces can be used to create a higher resistance to movement, thus increasing the exercising resistance.

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It is particularly advantageous to arrange a plurality of the elongate resilient pieces parallelly to and co-extensively

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with each other within the article so that, when the article is received over a joint of the body and the joint bends, the clothing material tends to maintain the parallel positioning of the elongate resilient pieces, thus providing an exponential increase of the exercising resistance compared with an arrangement in which the elongate resilient pieces are allowed to move out of their parallel relationship as the joint bends.

In a preferred embodiment, the clothing article includes form-fitting, lightweight, clothing material fitted with a series of extension springs which are encapsulated in pockets which are substantially parallel to each other and in close proximity to each other. The springs therefore give the article a built-in resistance so that, when the article is worn for prolonged periods of body movement, the body is required to work significantly harder during that physical movement.

In order that the invention may be clearly and completely disclosed, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 is a lateral view of a clothing article of a form of a full body suit being worn by a human being,

Figure 2 shows a transverse section taken on, for example, the line II-II in Figure 1,

Figure 3 is a fragmentary elevational view of an elongate resilient piece included in the clothing article,

Figure 4 is a posterior view of the article in the form of a body shirt,

Figure 5 is a side elevation of the article in the form of high-waist, thigh-length shorts,

5 Figure 6 is a side elevation of the article in the form of a sleeve,

Figure 7 is a side elevation of the article in the form of a legging,

10 Figure 8 is a side elevation of the article in the form of a glove,

Figure 9 a side elevation of the article in the form of stocking,

15 Figure 10 is a view similar to Figure 2, but showing a modified version,

20 Figure 11 is a perspective view showing an elongate resilient piece of the modified version of Figure 10,

Figure 12 is a view similar to Figure 2 of another modified version, and

25 Figure 13 is a perspective view of an elongate resilient piece of that other modified version.

Referring to Figure 1, the clothing article is in the form of a full body suit which covers the body from the neck to almost the feet and almost the hands. The article includes a
30 lightweight, flexible, stretchable, clothing material 1, for example "LYCRA" (Registered Trade Mark), allowing relatively free movement of the body and expansion and contraction of muscles. A zipper 2 facilitates the fitting of the article to
35 the body. Helical extension springs 4, each as shown in

Figure 3, are firmly encapsulated in elongate pockets 3. The pockets 3 are secured to the material 1 by threads 5 as shown in Figure 2. The springs 4, which may be of metal or plastics, and pockets 3 extend through portions of the material 1 which are worn over wearer's joints, such as in Figure 1 the elbow, shoulder, hip and knee joints. In each portion of the material 1 which is to be worn over a joint there are a plurality, preferably several, narrow springs 4 extending parallelly to each other and each spaced apart from another by an amount of the order of its own width. When the group of springs in that portion is worn over the appropriate joint and that joint bends, the springs bend but, because the group of springs is arranged in a curve transverse to the joint, the wearer needs to bend the springs about different axes from each other, so that the springs provide greater resistance to bending of the joint and thus more effective exercise than if the wearer needed to bend all of the springs in the group about only a common axis.

The modified versions of the clothing article shown in Figures 4 to 9 differ from the version shown in Figure 1 only in that they are intended for exercising of mainly the muscles terminating at the shoulder joints (Figure 4), at the hip joints (Figure 5), at an elbow joint (Figure 6), at a knee joint (Figure 7), at a wrist and finger and thumb joints (Figure 8) and at an ankle joint (Figure 9).

The elongate resilient pieces 6 shown in Figure 11 take the form of strips of elastomeric material bonded to the clothing material 1. Each strip 6 is of semi-circular cross-section to provide a flat face giving a relatively significant area for bonding. Alternatively, it may be feasible to form the strips 6 integrally with the material 1.

The elongate resilient pieces 7 shown in Figures 12 and 13

are similar to the springs 4, except that they are in the form of elastomeric rods.

5 The clothing articles described with reference to the drawings have the advantage that they do not need to provide support to body parts of the wearer and moreover do not significantly restrict movement of the joints covered by the elongate resilient pieces.